Preliminary Comments
of the
California Trucking Association
on the
U. S. Environmental Protection Agency's Diesel Fuel Impact Model

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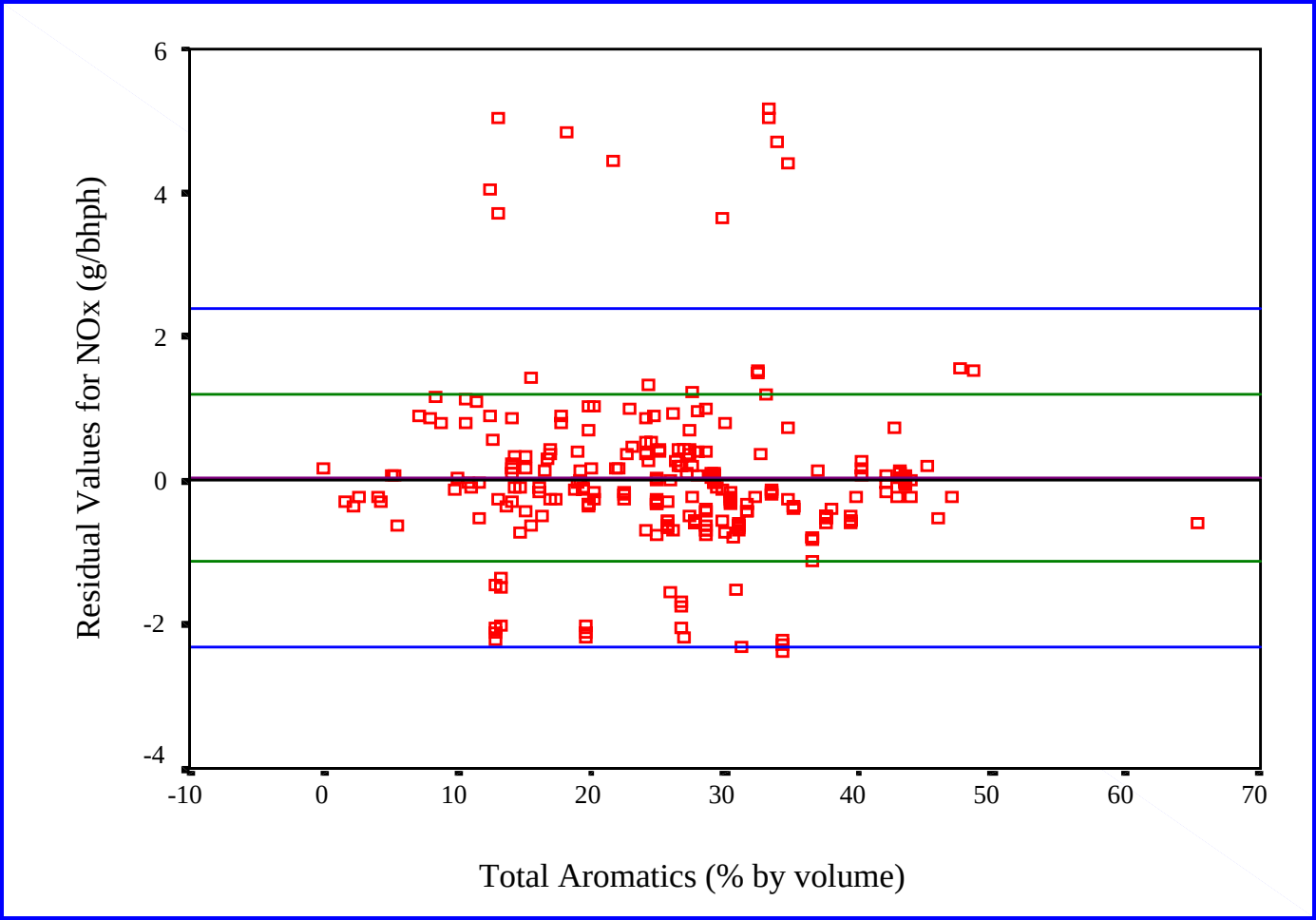
Statistical Suspicions

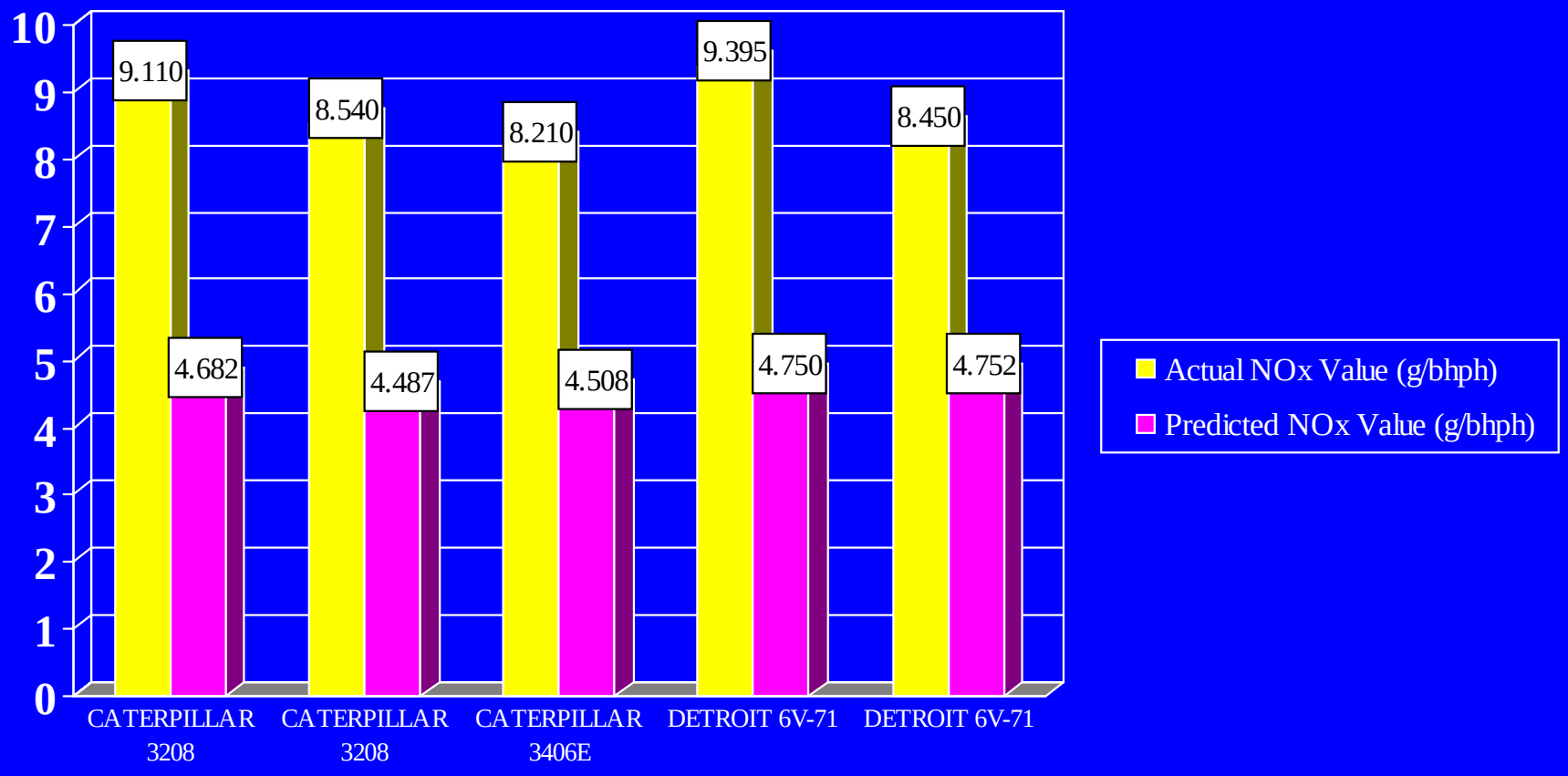
- Regression approach used is flawed.
  - Process of “forcing” terms in phase 5 of regression analysis, then working backwards and dropping terms is statistically invalid.
  - Process of “forcing” technology group intercepts, regardless of their statistical significance, into the second stage of the unified model is statistically invalid.
- Development of baseline fuel properties is suspect
  - The use of AAM calculated cetane index values to obtain the natural cetane number is invalid.
- The model simply does not accurately predict NOx values for the fuels present in the EPA database.

Residual NOx Values by Total Aromatics



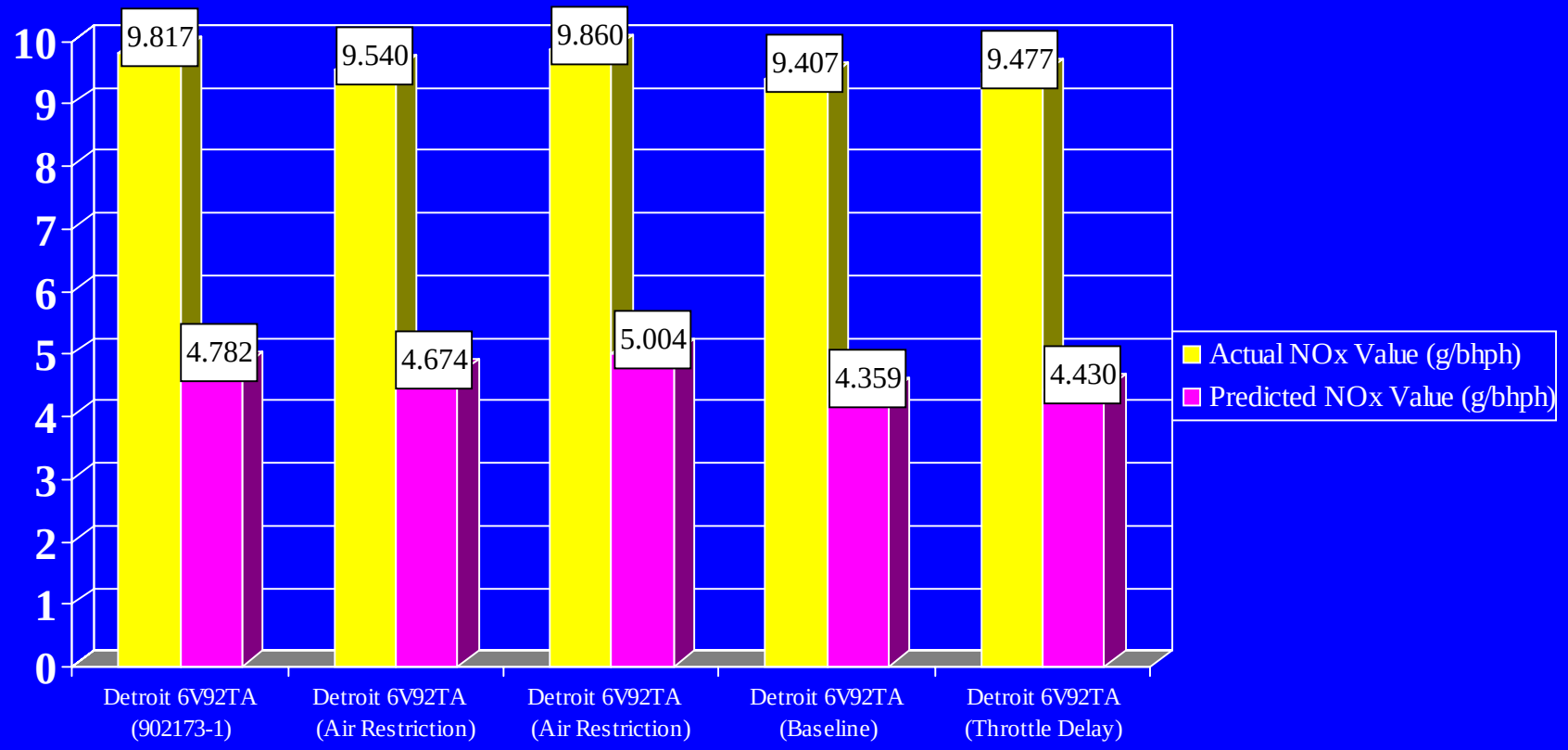
- Standard deviation of the residual values is 1.174 g/bhph. (green line)
- 95% confidence interval is 2.348 g/bhph. (blue line)
- The model error is nearly equal to the 2.5 g/bhph NOx certification value of engines that will be produced in 2002.

SAE 790490 Study



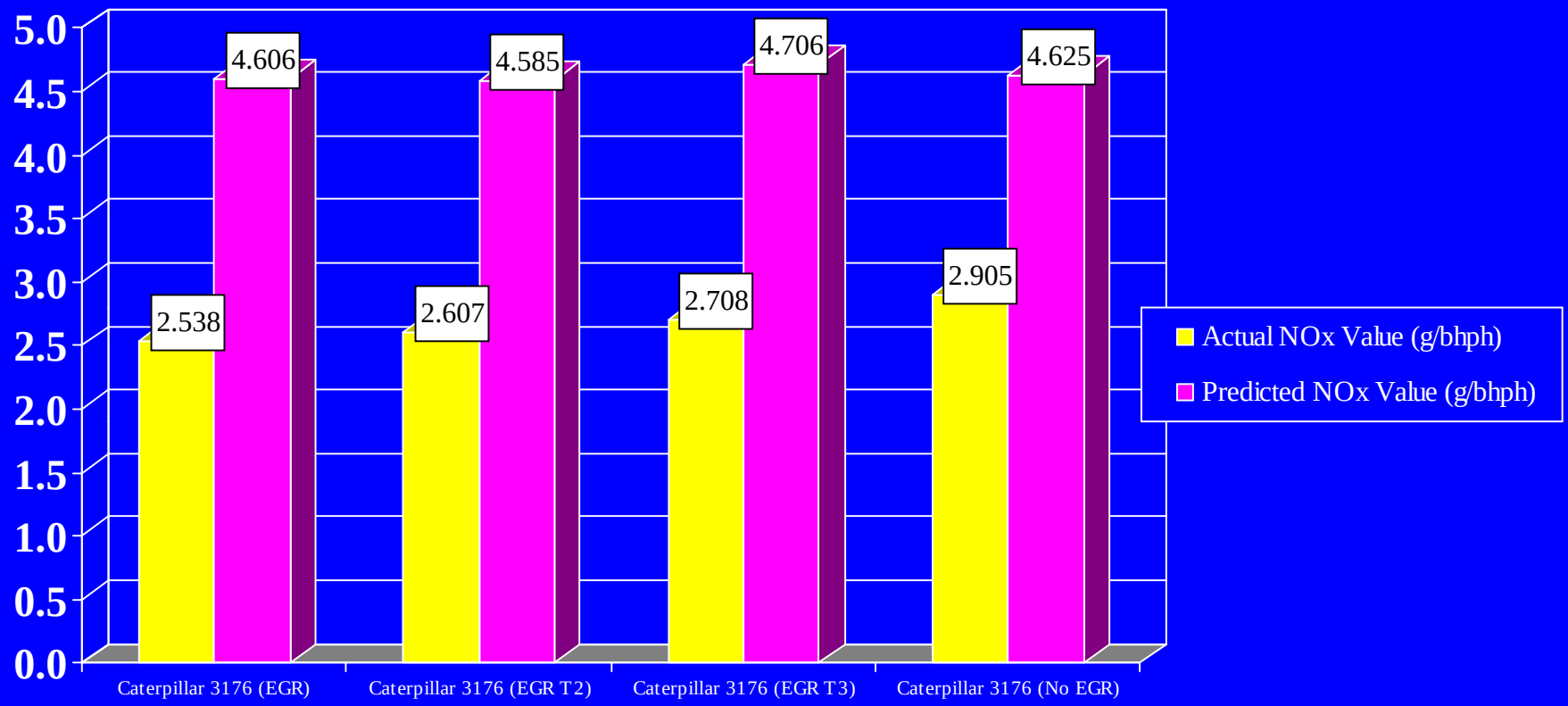
- Actual NOx values are nearly twice the predicted values for each engine in the study, using unified model equations. Four of the five engine models were model year 1979.

SAE 910735



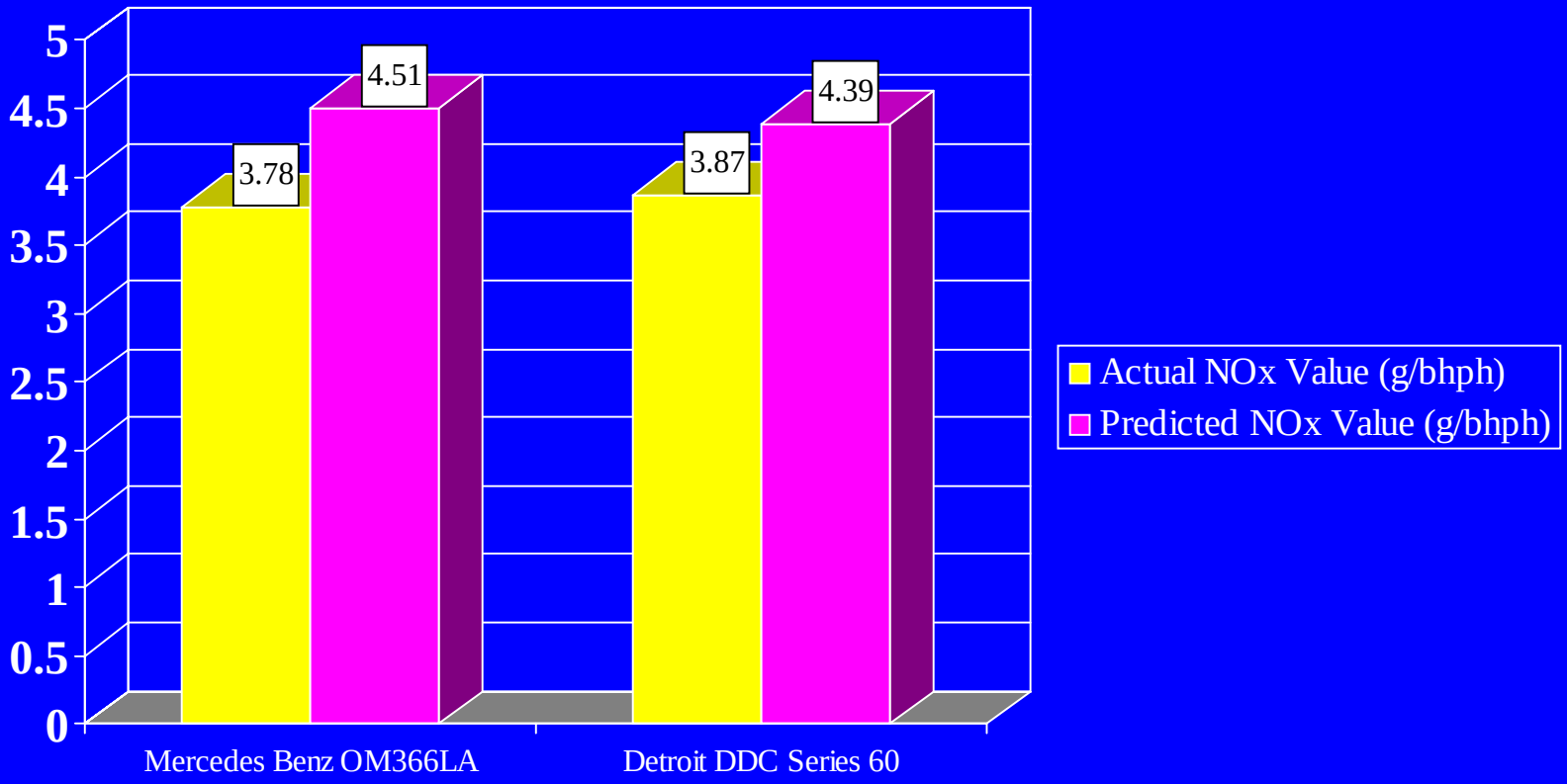
- The actual NOx values nearly twice the predicted values for each engine in the study. Four of the five engine models used in this study were 1986 model year engines.

HDEWG Phase II



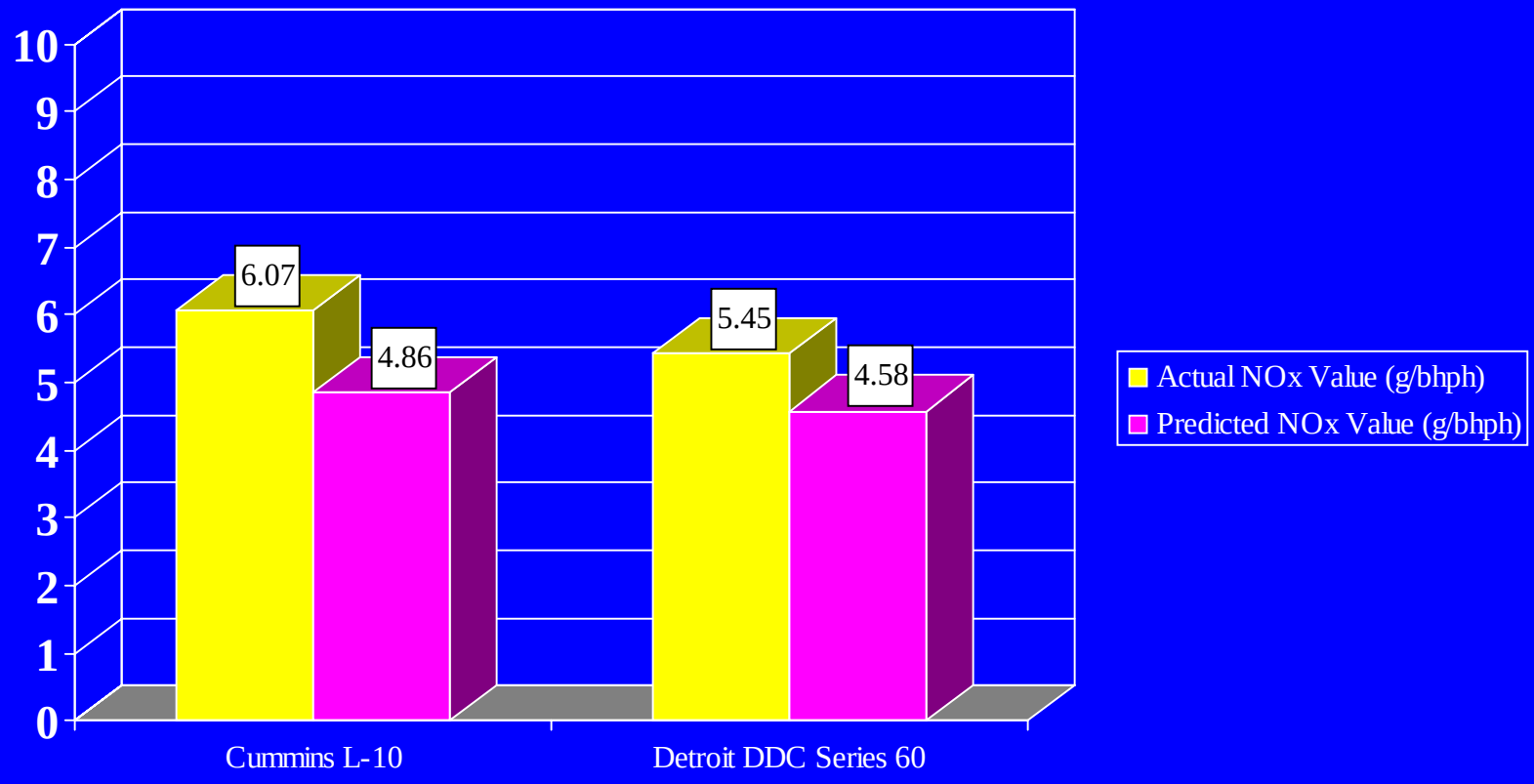
- The average actual NOx values are little more than half the average predicted values for each engine in the study. Three of the four engine models used in this study were 2004 prototypes with EGR.

SAE 932731



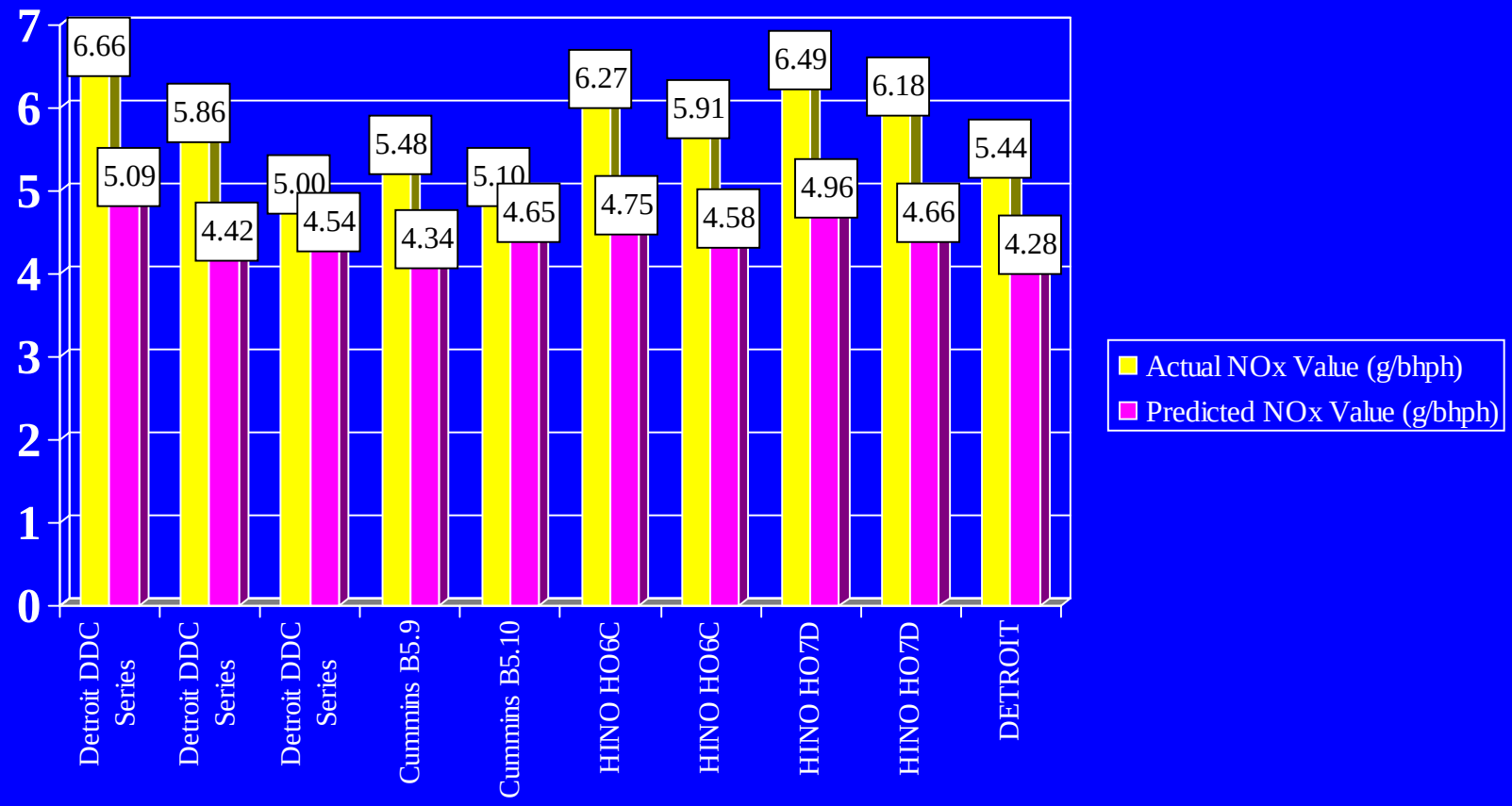
- The average NOx values for both 1991 model year engines in the study were more than 0.5 g/bhph less than the predicted value.

SAE 961973



- The model for this study underpredicts by approximately 1 g/bhph for each engine. The Cummins engine is model year 1990, and the Detroit DDC engine is model year 1994.

SAE 970758



- The error of predictions for this study ranges from 0.446-1.576 g/bhph. The engines are 1991, 1994, and 1995 model years.

NOx Means: Actual Vs. Predicted

Study I.D.	Actual Mean	Actual Std. Deviation	Predicted Mean	Predicted Std. Dev.
ACEA	4.188740	.0857588	4.547405	.205571
CARB-LOCO	4.578250	.199727	4.802992	.184788
CARB-TOXIC	4.642775	.191054	4.592084	.249717
EPEFE	5.007960	.107866	4.628710	.106967
HDEWG II	**2.693919**	**.288042**	**4.616080**	**.175073**
SAE1999-01-1117	5.271107	.281760	N/A	N/A
SAE1999-01-1478	4.874045	.149240	4.857745	.160379
SAE1999-01-3606	3.819850	.254771	4.216951	.393206
SAE2000-01-2890	5.300600	1.004470	4.688555	.108979
SAE790490	**8.741000**	**.492676**	**4.691605**	**.206151**
SAE852078	6.581667	.302484	N/A	N/A
SAE881173	N/A	N/A	4.927084	.299581
SAE902172	4.901727	.329621	4.802155	.307995
SAE902173	4.153889	.192284	4.783952	.0780361
SAE910735	**9.620000**	**.205386**	**4.659139**	**.169134**
SAE912425	N/A	N/A	4.738226	.186764
SAE922214	5.213088	.319793	4.671979	.170556
SAE922267	4.802569	.288264	4.681415	.245969
SAE932685	5.339917	.187386	4.486971	.134451
SAE932731	**3.823000**	**.0617540**	**4.446123**	**.0837454**
SAE932734	4.210625	.105710	4.623685	.275453
SAE932767	4.096667	.100664	4.736863	.0727007
SAE932800	4.268000	.454170	4.686493	.539265
SAE942019	4.361833	.132733	4.711294	.153592
SAE942053	4.668333	.153418	N/A	N/A
SAE961973	**5.758750**	**.443710**	**4.720171**	**.193923**
SAE961974	4.906794	.0187743	N/A	N/A
SAE970758	**5.839496**	**.571811**	**4.629442**	**.257520**
SAE971635	4.807778	.179498	4.580008	.171153
SAE972894	4.413763	.0199457	4.525670	.0320481
SAE972898	4.307119	.529786	4.430138	.317218
SAE972904	3.945556	.186329	4.620968	.180421
VE-1_PHASE I	4.754671	.264022	4.871193	.311059
VE-1_PHASE II	4.562557	.252211	4.737030	.199777
VE 10	4.226398	.284734	4.628436	.0787428
Totals	**4.747835**	**1.153177**	**4.681059**	**.221509**

Actual NOx Vs. Predicted NOx

- The spread of the model predictions is drastically different from the spread of actual values.
  - Standard deviation of actual NOx measurements in the database is 1.153 g/bhph. Standard deviation of *predicted* NOx measurements is 0.222 g/bhph.
  - The 95% confidence interval of actual NOx measurements in the database is 2.306 g/bhph, whereas the 95% confidence interval of *predicted* NOx measurements in the database is 0.444 g/bhph.
  - Range of actual NOx measurements is 2.37-9.86 g/bhph. Range of *predicted* NOx measurements is 3.94-5.32 g/bhph.

Other Concerns

- The model goes beyond the scope of the analysis by estimating percent change in emissions based on a change from the baseline fuel.
  - Staff discussion document originally stated that the most weight in the model was given to engine type, then relies on fuel properties to develop the function for percent change in emissions.
- Extrapolation of model equations to account for expected cleaner fuels produced in the future cannot be justified in any case.
  - The model doesn't predict accurately for fuels already accounted for in the database. It would be speculative at best to use the model for expected fuels.